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Self-bearing tyre for motor-vehicle wheels incorporating elastic-support inserts in the sidewalls.

It is described a tyre the carcass (2) of which incorporates, at each of the sidewalls (5) thereof, a first and a second reinforcing insert (16, 17) having in section a substantially lenticular form tapering to the ends, interposed between a first carcass ply (10) and a second carcass ply (11) and mutually joined at the tyre maximum-chord point. Also applied to each sidewall against the carcass ply (10) turned to the inner part of the tyre is an elastic support insert

(13) of lenticular section exhibiting a maximum-thickness portion (13a) disposed at the junction point (18) between the two reinforcing inserts (16, 17). The elastic support insert (13) comprises a substantially stiff counter core (14) of lenticular section, and a cover (15) made of elastomeric material having a low modulus of elasticity, coating the counter core (14) at one side thereof turned towards the carcass plies.

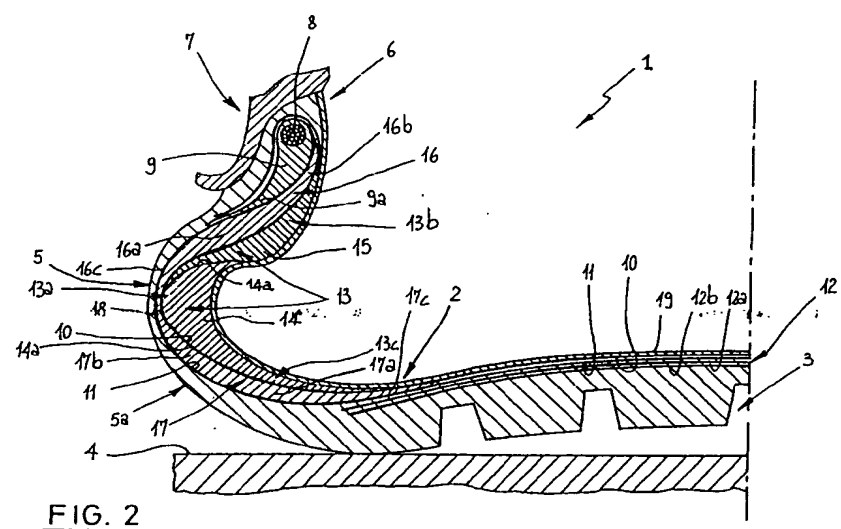


FIG. 2

EP 0 542 252 A1

The present invention relates to a self-bearing tyre for motor-vehicle wheels incorporating elastic support inserts in the sidewalls, of the type comprising a carcass, a tread band disposed crown-wise to said carcass, an a circumferentially-inextensible annular belt structure, overlying said carcass so as to form an annulus at a radially inner position to said tread band, comprising: a pair of circumferentially inextensible reinforcing rings, each inserted in a bead defined along an inner circumferential edge of a tyre; a pair of elastomeric fillers each of which extends along an outer circumferential edge of one of the reinforcing rings tapering away from the tyre axis; at least one carcass ply exhibiting its edges folded back around the reinforcing rings and elastomeric fillers; at least a pair of annular elastic support inserts of lenticular sectional form, made of elastomeric material, each of which is applied to the carcass ply against the inner part of one of the tyre sidewalls extending radially between one of the beads and the corresponding edge of the belt structure.

It is known that there are motor-vehicle tyres provided with a self-bearing carcass, that is capable of bearing the vertical loads and drift thrusts transmitted to the tyre even when it is under completely deflated conditions. In this way, in case of puncture of one or more tyres, the motor-vehicle will be still able to travel over rather long distances even at relatively high speeds, without important losses occurring in terms of road-holding and ride comfort.

One known type of self-bearing carcass substantially provides that an annular support insert of lenticular sectional form and made of elastomeric material be associated with each of the tyre sidewalls, said insert being applied to the carcass ply or plies which, as known, are provided in the tyre itself. These inserts having relatively high thickness and modulus of elasticity, are adapted to bend so as to offer sufficient elastic reaction to the vertical loads and horizontal drift thrusts transmitted to the tyre in a deflated condition.

In order to enable elastomeric inserts of smaller thickness and lower modulus of elasticity to be used, so as to improve the ride comfort and reduce the heat generation within the tyre, according to another known type of self-bearing carcass each of the tyre sidewalls is provided with two annular elastomeric support inserts disposed in side by side relation with respect to each other, at least one of which is interposed between two carcass plies.

The applicant has recently studied and set up another type of self-bearing carcass described in the European Patent Application EP-495.375 in which, for each tyre sidewall, an annular elastic support insert is provided which is arranged in-

wardly of the sidewall, against a first carcass ply. Combined with this elastic support insert is a pair of annular reinforcing inserts disposed substantially in radial alignment relationship between the first carcass ply and a second carcass ply laid on top of the first ply. The reinforcing inserts are consecutively connected to each other at a junction point located at the height of the maximum-thickness area of the support insert and substantially coincident with the maximum-chord point of the tyre.

During the tyre use the elastic support insert is deformed in the presence of bending stresses in order to elastically counteract the mutual approaching of the reinforcing inserts that substantially behave as stiff arms mutually hinged at their junction point.

In accordance with the present invention it has been found that by providing the elastic support insert with a substantially stiff core occupying at least the maximum-chord point of the tyre, and more exactly the area in which compressive deformations are greatly concentrated, an important increase in the carcass lift under deflated conditions of the tyre is achieved, although very soft materials are adopted for making the remaining part of the support insert so as to greatly improve the ride comfort under any use condition.

The present invention in one aspect relates to a self-bearing tyre for vehicle wheels incorporating elastic support inserts in the sidewalls, characterized in that each of said annular elastic support inserts comprises: a counter core of substantially lenticular sectional form occupying at least partly an area of maximum thickness of the elastic support insert and exhibiting an abutment side of convex profile facing said carcass ply; an elastically deformable cover coating the counter core at least partly on said abutment side and defining at least one terminal end portion of the elastic support insert, said cover exhibiting a lower dynamic modulus than the counter core.

The invention in another aspect relates to a tyre the carcass of which further comprises, within each tyre sidewall, a first and a second annular reinforcing insert made of elastomeric material, interposed between one carcass ply and a second carcass ply disposed upon the first carcass ply, said first and second reinforcing inserts exhibiting a substantially lenticular section becoming thinner towards the ends, and being mutually interconnected at a junction point located substantially at the height of the maximum-thickness area of the elastic support insert.

In one embodiment, the counter core defines a radially external terminal end portion of the elastic support insert. In greater detail, the counter core substantially extends from the maximum-chord

region exhibited by the tyre under deflated conditions, to near the side edge of the belt structure. In said maximum-chord region the counter core has its maximum-thickness area.

In said one embodiment the cover coats the abutment side of the counter core from a radially internal end thereof to near the maximum-thickness area of the core itself, the remaining part of the abutment side being applied against said carcass ply.

In a second embodiment, the counter core is completely disposed substantially at the maximum-width point of the tyre and the cover completely coating said abutment side defines both the inner and outer end portions of the elastic support insert. In this case, the cover at the counter core preferably has a minimum thickness lower than 2.5 mm.

The counter core, optionally made of elastomeric material incorporating reinforcing fibers, preferably has a dynamic modulus included between 8 and 12 Megapascal (MPa) and low hysteresis loss ($\tan \delta$ less than 0.1).

In accordance with a further feature of the invention, the sectional surface extension of the counter core is included between 30% and 60% of the overall surface extension in section of said elastic support insert.

It is also preferentially provided that the counter core should exhibit a maximum radial extension included between 1/4 and 3/4 of the overall radial extension of said elastic support insert.

In accordance with a further feature of the invention, the dynamic modulus of the cover is preferably included between 2 and 6 MPa.

Further features and advantages will become more apparent from the detailed description of preferred embodiments of a self-bearing tyre for vehicle wheels incorporating elastic support inserts in the sidewalls in accordance with the present invention, given hereinafter by way of non-limiting example with reference to the accompanying drawings, in which:

- Fig. 1 shows the cross-sectional profile, interrupted at the equatorial plane, of one embodiment of a tyre made in accordance with the present invention, in a normally inflated condition;
- Fig. 2 is a sectional view of the tyre profile shown in Fig. 1 in a flat-ride condition;
- Fig. 3 shows the cross-sectional profile, interrupted at the equatorial plane, of a second embodiment of the tyre of the invention, in a normally inflated condition;
- Fig. 4 is a sectional view of the tyre profile shown in Fig. 3, in a flat-ride condition.

Referring to the drawings a self-bearing tyre for motor-vehicles incorporating elastic support

inserts in the sidewalls in accordance with the present invention, has been generally identified by reference numeral 1.

Tyre 1 comprises a carcass 2, preferably of the radial type, around which, as known, there is defined a tread band 3 in the form of an annulus and arranged to act in abutment on a roadway 4, a belt structure 12, disposed crown-wise to said carcass, and two sidewalls 5 (only one of which is shown) extending in a substantially radial direction from the opposite edges of the tread band 3 and terminating in two beads 6 (only one of which is shown) defined along the inner circumferential edges of the tyre 1. At the beads 6 the tyre 1 is engaged to a mounting rim 7 so as to define a motor-vehicle wheel.

Carcass 2 conventionally comprises a pair of circumferentially inextensible reinforcing rings 8 commonly referred to as "bead cores" each of which carries, along the outer circumferential edge thereof, an elastomeric filler 9 tapering away from the tyre axis. The reinforcing rings 8, each of which is inserted in one of the beads 6, give said beads the necessary stiffness to ensure that the mounting rim 7 will hold the tyre 1 in the best manner.

In addition, carcass 2 has at least one carcass ply 10 extending along the whole tyre section and exhibiting its opposite edges folded back around the respective reinforcing rings 8.

In a preferential embodiment, a second carcass ply 11 is also provided which is disposed upon the first carcass ply 10 and also exhibits its edges folded back around the respective bead cores 8.

Still in a manner known per se, said circumferentially inextensible belt structure 12 is comprised of one or more belt bands 12a, 12b which are superposed like an annulus on the carcass plies 10, 11.

For the sake of clarity, in the accompanying drawings the various carcass plies 10, 11 and belt bands 12a, 12b are merely represented by blackened solid lines, spaced apart from each other. Actually, said plies are superposed in mutual contact relationship, except at the sidewalls 5, as will be better clarified below.

In accordance with the present invention, the tyre 1 further comprises, at each sidewall 5, at least one annular elastic support insert 13 applied to the first carcass ply 10, at an axially inner position relative to the tyre 1. The elastic support insert 13 extends radially between the respective bead 6 and the corresponding edge of the belt band 12 following a profile of substantially lenticular section. In greater detail, the elastic support insert 13 has a central area of maximum thickness 13a disposed substantially at the same height as the maximum-chord point, that is the maximum-width point, of the tyre 1. More specifically, this

maximum-thickness area is located at the maximum-chord point taken by the tyre 1 under deflection conditions, in the absence of inflating pressure. Departing from this maximum-thickness area 13a in a substantially radial direction, is an inner end portion 13b tapering substantially towards the filler 9 and an outer end portion 13c tapering substantially towards the side edge of the belt band 12.

In an original manner, the elastic support insert 13 comprises a counter core 14 of substantially lenticular section occupying at least partly the maximum-thickness area 13a and exhibiting an abutment side 14a of convex profile facing the carcass plies 10, 11. Combined with the counter core 14 is an elastically deformable cover coating the counter core at least on part of the abutment side 14a thereof.

The counter core 14 is made of elastomeric material having a high dynamic modulus, higher than 6 MPa and preferably included between 8 and 16 MPa. The counter core also has low hysteresis loss ($\tan \delta$ lower than 0.1).

It is pointed out that all values relating to dynamic modulus and hysteresis loss ($\tan \delta$) cited in the present description are intended as measured on a test piece of elastomeric material and cylindrical form (14 mm diameter, 25 mm length) preloaded with an axial deflection of 20% and submitted to a cyclic sinusoidal deformation of a width of $\pm 7.5\%$ and frequency of 100 Hz, the temperature being 100 °C.

Measurements are carried out on the test piece put in an oven so as to ensure a constant temperature during the test, and after a conditioning time corresponding to 100 cycles of sinusoidal deformation.

Conveniently, in order to give the counter core 14 a dynamic modulus high enough, reinforcing fibers such as aramide, nylon or the like can be optionally incorporated in the elastomeric material used for making said core.

The cover 15, in turn, is made of elastomeric material having a dynamic modulus preferably ranging between 2 and 6 MPa and at all events lower than the dynamic modulus of the counter core 14.

In the preferential solution shown in Figs. 1 and 2, the counter core 14 substantially extends from the maximum-width region of the tyre 1 to one side edge of the belt structure 2, so as to define the outer end portion 13c of the elastic support insert 13. Preferably, the maximum-thickness area of the core 14 is coincident with the maximum-thickness area of the elastic support insert 13 and, at all events, is substantially located in register with the maximum-chord area exhibited by the tyre 1 under deflated conditions.

Still referring to Figs. 1 and 2, the cover 15 defines the inner end portion 13b of the insert 13 and coats the abutment side 14a of the counter core 14 starting from the radially inner end of said core and going as far as the maximum-thickness point of the same. The remaining part of the abutment side 14a which is not coated with cover 15, is directly applied against the first carcass ply 10.

In the embodiment shown in Figs. 3 and 4 a smaller counter core 14 than above is provided, which is located at the maximum-thickness area 13a of the insert 13. In this case the cover 15 coats the core 14 over the whole extension of the abutment side 14a and defines both the inner and outer end portions, 13b and 13c, of the insert 13.

As viewed from Figs. 3 and 4, the cover 15 becomes remarkably thinner, due to the presence of the core itself, at the maximum-thickness area 13a of the elastic support insert 13 taken as a whole. Under this situation the cover 15 at the maximum-thickness area 13a of the elastic support insert should preferably exhibit a minimum thickness included between 1 and 2.5 mm, so as to suitably isolate the counter core from the carcass ply 10. However it is also possible that the abutting side 14a of core 14 should extend within the cover 15 as far as it touches the first carcass ply 10.

It is noted that the dimensional ratios between the counter core 14 and cover 15 as well as the values of the respective moduli can vary even to a great extent, depending on the operational features to be given to the tyre 1.

As a rule it is possible to state that, the overall section of the elastic support insert 13 being equal, a size increase in the counter core 14 section brings about an increase in the lift and direction steadiness under flat-ride conditions. In the connection it is noted that the embodiment shown in Figs. 1 and 2, in which the counter core 14 extends as far as the belt structure edge, is particularly adapted to give excellent performance in terms of direction steadiness, resistance to shift thrusts and lift, under flat-ride conditions.

On the contrary, a size reduction in the counter core section will tend to improve the ride comfort. In the connection it is noted that the embodiment shown in Figs. 3 and 4 is particularly adapted to offer an excellent ride comfort under normal ride conditions, that is when the tyre is inflated to the normal pressure.

It is pointed out just as an indication that when the tyre 1 is to be used for normal road cars, the section of the counter core 14 should preferably be in the range of 30% to 60% of the overall section of the elastic support insert 13. In addition, still as a preferential solution, when the tyre 1 is under normal inflation conditions the maximum radial extension of the counter core 14 should be included

between 1/4 and 3/4 of the overall radial extension of the elastic support insert 13.

In both of the above described solutions, first and second annular reinforcing inserts 16, 17 are provided to be interposed between the first and second carcass plies 10, 11 at each of the tyre sidewalls 5; they are of substantially lenticular form in section and become thinner to the ends. These reinforcing inserts 16, 17 are in consecutive alignment moving radially away from the tyre axis and are interconnected with each other at a junction point 18 located substantially adjacent the maximum-thickness middle area 13a of the elastic support insert 13.

In greater detail, the first annular reinforcing insert 16 has the respective middle portion 16a disposed in side by side relation with the inner end portion 13b of the elastic support insert 13, substantially at the height of the end edge 9a of the corresponding filler 9. Departing from this middle portion 16a is a radially inner portion 16b extending alongside the filler 9 and substantially tapering to the reinforcing ring 8, as well as a radially outer portion 16c that becomes thinner away from the filler, tapering close to the junction point 18.

The second annular reinforcing insert 17 in turn has a middle portion 17a which is disposed in side by side relation with the outer end portion 13c of the elastic support insert 13, at the connection area, commonly referred to as "buttress" and denoted by 5a, between the tread band 3 and the corresponding sidewall 5. Departing from the middle portion 17a of the second reinforcing insert 17 is a radially inner portion 17b tapering towards the filler 9 until the junction point 18, as well as a radially outer portion 17c tapering towards the underside of a corresponding edge of the belt structure 12.

The reinforcing inserts 16, 17 are made of elastomeric material having a dynamic modulus preferably ranging between 4 and 6 MPa, and at all events higher than the dynamic modulus of the cover 15 belonging to the elastic support insert 13.

The dimensional features of the reinforcing inserts 16, 17 as well as those of the elastic support insert 13, can vary depending on the type of vehicle for which the tyre 2 is intended, and on the operating features that the tyre must possess.

As a rule, the thickness of the reinforcing inserts 16, 17 and the elastic support insert 13 is reduced when the tyre 1 is intended for light-weight cars and/or in order to enhance the carcass strength at high speeds rather than the carcass life under flat-ride conditions. Just as an indication, when the tyre 2 is intended for use in normal cars the thickness of the first reinforcing insert 16 should be conveniently included between 2.5 mm and 7 mm at the middle area 16a, whereas the

thickness of the second reinforcing insert 17, reference being still made to the middle area 17a thereof, must be preferably included between 2.5 mm and 5 mm. The elastic support insert 13, in turn, will preferably have an overall thickness ranging from 5 mm to 15 mm, at the maximum-thickness area 13a thereof.

In addition, the thickness of the first and second reinforcing inserts 16, 17 at the point of mutual junction 18 should preferably be less than 3.5 mm.

It should be noted too that if the tyre 1 is of the tubeless type the whole inner surface of the carcass 2 will be coated with an air-tight sealing layer 19 made of elastomeric material based on a butyl blend for example.

The operating behaviour of the tyre of the invention described above mainly as regards structure is as follows, reference being made to the more complicated embodiment provided with two carcass plies 10 and 11.

It is to be stated first of all that especially when the tyre is in a deflated condition, the first and second reinforcing inserts 16, 17 enclosed between the first and second carcass plies 10, 11 substantially behave as two hinged arms, designed to rotate with respect to each other at the junction point 18 in order to assist the sidewall 5 deformations in a radial direction. Meanwhile, they elastically react substantially behaving like counter-bent leaf springs so as to inhibit deformations of the sidewall 5 resulting from drift thrusts oriented parallelly to the tyre axis and taking place when there is a bend during the car ride.

The elastic support insert 13, in turn, substantially behaves like a spring counteracting the tendency of the first and second reinforcing inserts 16, 17 to move close to each other by effect of the load weighing on the motor-vehicle wheel as well as of possible drift thrusts. In the connection it will be noted that the bending produced on the elastic support insert 13 is such that the maximum-thickness area 13a of said insert will tend to move axially to the outside of the tyre 1, so as to advantageously keep the carcass plies 10, 11 tensioned. This tensioning, which is on the other hand resisted by the consequent bending produced on the reinforcing inserts 16, 17, ensures the absence of localized compressive stresses on the carcass plies 10, 11 that would be greatly dangerous for the structural integrity of the tyre 1.

It is to be noted that said ply tensioning phenomenon as a consequence of the bending produced on the elastic support insert 13 and the resulting displacement of the maximum-thickness area thereof, also takes place in a tyre having a single carcass ply, where the beneficial effects of said phenomenon are present as well, although to a reduced degree.

During a normal use of the tyre 1 the load weighing on the wheel is almost completely resisted by the air pressure within the tyre. Under this situation, as shown in Figs. 1 and 3, the elastic support insert 13 is only slightly bent and during the ride the dynamic stresses due to the presence of asperities on the roadway 4 are efficiently taken up by the elastic deformations imposed to the cover 15 of the elastic support insert 13. Advantageously, by virtue of the low dynamic modulus of the elastomeric material forming the cover 15, said dynamic stresses are substantially taken up without reaction forces being transmitted to the mounting rim 7 and hence the motor-vehicle structure.

Therefore the optimal conditions for a comfortable ride are achieved. In the connection it is also to be pointed out that under conditions of normal inflation pressure the counter core 14 is little concerned with said dynamic stresses and consequently does not transmit forces of noticeable amount to the tyre structure.

Referring now to Figs. 2 and 4, should the tyre 1 undergo a partial or complete loss of air pressure, as a result of a puncture for example, the vertical loads transmitted to the motor-vehicle wheel are exclusively resisted by the elastic reactions resulting from the deformation of the sidewalls 5.

Under this situation the counter core 14 provided in each of the sidewalls 5, due to its high dynamic modulus, can withstand, without undergoing excessive elastic deformations, all compressive thrusts resulting from the important elastic deformation imposed to the cover 15, greatly bent around the core itself.

In conclusion, since the counter core 14 is located in the respective elastic support insert 13 just at the area where the greatest compressive efforts tend to concentrate, it prevents the elastomeric material forming the cover 15 and having a low modulus from collapsing by effect of said stresses.

The presence of the counter core 14 also protects the coating layer 19 from wear and overheating phenomena due to rubbings occurring at the maximum-chord point of the tyre, thereby eliminating the necessity of introducing into the material used for making the coating layer, lubricants or other additives that could impair the airtightness thereof.

As clearly shown in Figs. 2 and 4, the outer cover 15 is substantially undeformed at the areas of reduced thickness, disposed close to the counter core 14, whereas important swellings are present at the radially internal end portion 13b (Fig. 2), or at the end portions 13b, 13c (Fig. 4) of the elastic support insert 13, that is to say where the cover faces the inner part of the tyre 1.

This situation brings about an excellent distribution of the compressive efforts in the section of the elastic support insert 13, unlike the behaviour of any type of known self-bearing carcass where the compressive efforts were concentrated at the maximum-chord point of the tyre and tended to produce localized overheatings.

It will be also recognized that the presence of swellings at the end portions 13b, 13c of the elastic support insert 13 is evidence of the presence in the cover 15 of basically tensile surface efforts, that is efforts capable of eliminating any risk of overheating due to localized rubbings in mutually contacting surfaces.

Therefore, as compared to the known art, the invention has achieved an important improvement in the distribution of the efforts within the carcass, thereby offering a longer lifetime for the tyre. At the same time, the use of elastomeric material of low modulus for the elastic support insert 13 instead of highly stiff elastomeric material as necessarily required in the known art, leads to an important improvement in the ride comfort, without on the other hand reducing the operating self-bearing features of the tyre.

In the connection, the results of practical tests comparing the tyre embodying the solutions shown in Figs. 3 and 4 with a geometrically identical tyre having however an elastic support insert of monolithic form made in accordance with the known art have shown that the tyre of the invention offers a 10% reduction in vertical stiffness and a 50% increase in the distance covered under flat-ride conditions.

Obviously, many modifications and variations may be made to the invention as conceived. In particular, it is pointed out that the invention is also suitable for carcass devoid of the reinforcing inserts 16, 17 which are on the contrary provided in the preferential embodiment herein described.

Claims

1. A self-bearing tyre for motor-vehicle wheels, that is incorporating elastic support inserts in the sidewalls thereof, comprising a carcass (2), a tread band (3) disposed crown-wise to said carcass (2), and a circumferentially-inextensible annular belt structure (12), overlying said carcass (2) so as to form an annulus at a radially inner position to said tread band (3), said carcass (2) comprising:
 - a pair of circumferentially inextensible reinforcing rings (8), each inserted in a bead (6) defined along one inner circumferential edge of the tyre (1);
 - a pair of elastomeric fillers (9) each of which extends along an outer circum-

- ferential edge of one of the reinforcing rings (8) tapering away from the tyre axis;
- at least one carcass ply (10) exhibiting its edges folded back around the reinforcing rings (8) and elastomeric fillers (9);
 - at least a pair of annular elastic support inserts (13) of lenticular sectional form, made of elastomeric material, each of which is applied to the carcass ply (10) against the inner part of one of the tyre sidewalls (5) extending radially between one of the beads (6) and the corresponding edge of the belt structure (12), characterized in that each of said annular elastic support inserts (13) comprises:
 - a counter core (14) of substantially lenticular sectional form, occupying at least partly an area of maximum thickness (13a) of the elastic support insert (13) and exhibiting an abutment side (14a) of convex profile facing said carcass ply (10);
 - an elastically deformable cover (15) coating the counter core (14) at least partly on said abutment side (14a) and defining at least one terminal end portion (13b, 13c) of the elastic support insert (13), said cover (15) exhibiting a lower dynamic modulus than the counter core (14).
2. A tyre according to claim 1, characterized in that it further comprises, within each tyre sidewall (5), a first and a second annular reinforcing insert (16, 17) made of elastomeric material, interposed between the first carcass ply (10) and a second carcass ply (11) disposed upon the first carcass ply, said first and second reinforcing inserts (16, 17) exhibiting a substantially lenticular section becoming thinner towards the ends, and being mutually interconnected at a junction point (18) located substantially at the height of the maximum-thickness area (13a) of the elastic support insert (13).
 3. A tyre according to claim 1, characterized in that said counter core (14) defines a radially external terminal end portion (13c) of the elastic support insert (13), said cover (15) defining a radially internal end portion (13b) of the elastic support insert (13).
 4. A tyre according to claim 3, characterized in that said counter-core (14) substantially extends from the maximum-width region of the tyre (1) to one side edge of said belt structure (12).
 5. A tyre according to claim 4, characterized in that the counter core (14) has its maximum thickness at the maximum-width area of the tyre (1) under completely deflated conditions.
 6. A tyre according to claim 3, characterized in that the cover (15) coats the abutment side (14a) of the counter core (14) starting from a radially internal end of said core to near the maximum-thickness area of the same, the remaining part of the abutment side (14a) being applied against said carcass ply (10).
 7. A tyre according to claim 1, characterized in that the cover (15) coats the counter core (14) throughout the whole extension of the abutment side (14a) thereof and defines, substantially in opposite directions, radially internal (13b) and radially external (13c) end portions of the elastic support insert (13).
 8. A tyre according to claim 7, characterized in that said counter core (14) is located substantially at the maximum-width point exhibited by the tyre (1) under completely deflated conditions.
 9. A tyre according to claim 1, characterized in that said cover (15) has a dynamic modulus included between 2 and 6 MPa.
 10. A tyre according to claim 1, characterized in that said counter core (14) has a dynamic modulus in the range of 6 to 16 MPa.
 11. A tyre according to claim 1, characterized in that the counter core (14) is made of elastomeric material incorporating reinforcing fibers.
 12. A tyre according to claim 1, characterized in that the cover (15) at the counter core (14) exhibits a minimum thickness lower than 2,5 mm.
 13. A tyre according to claim 1, characterized in that the cross sectional surface extension of the counter core is included between 30% and 60% of the overall cross sectional surface extension of said elastic support insert (13).
 14. A tyre according to claim 1, characterized in that the counter core (14) exhibits a maximum radial extension included between 1/4 and 3/4

of the overall radial extension of said elastic support insert (13).

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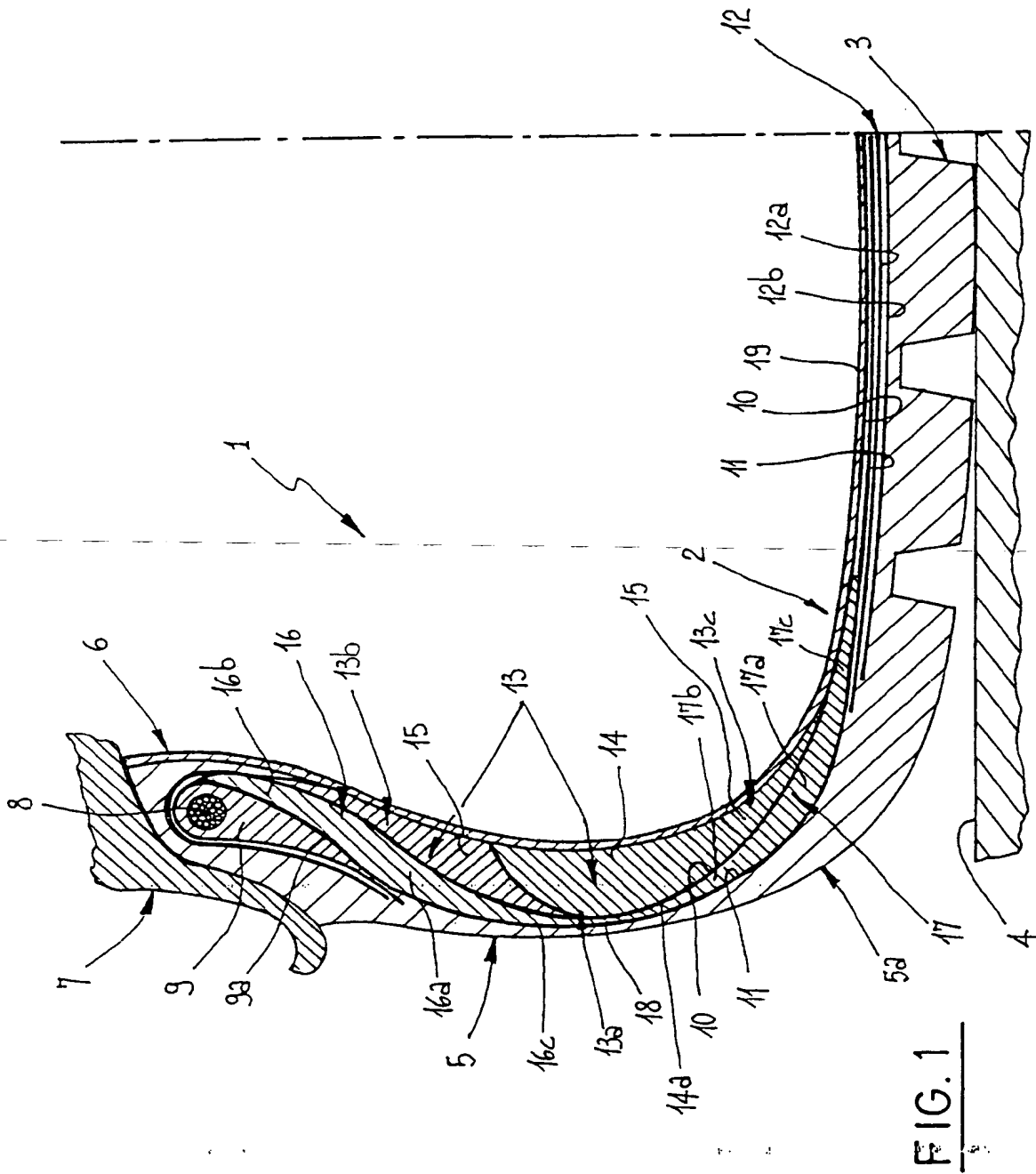
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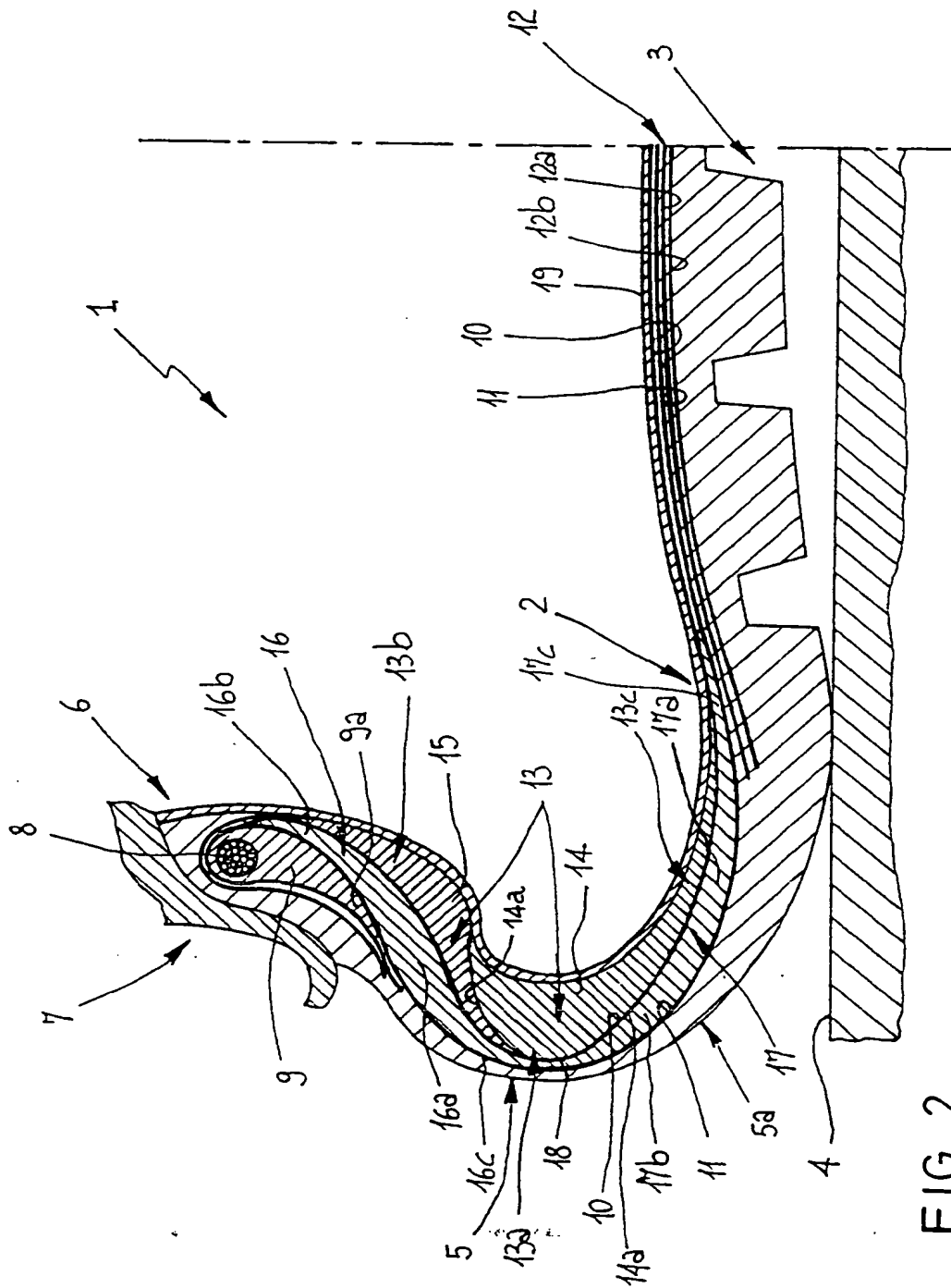
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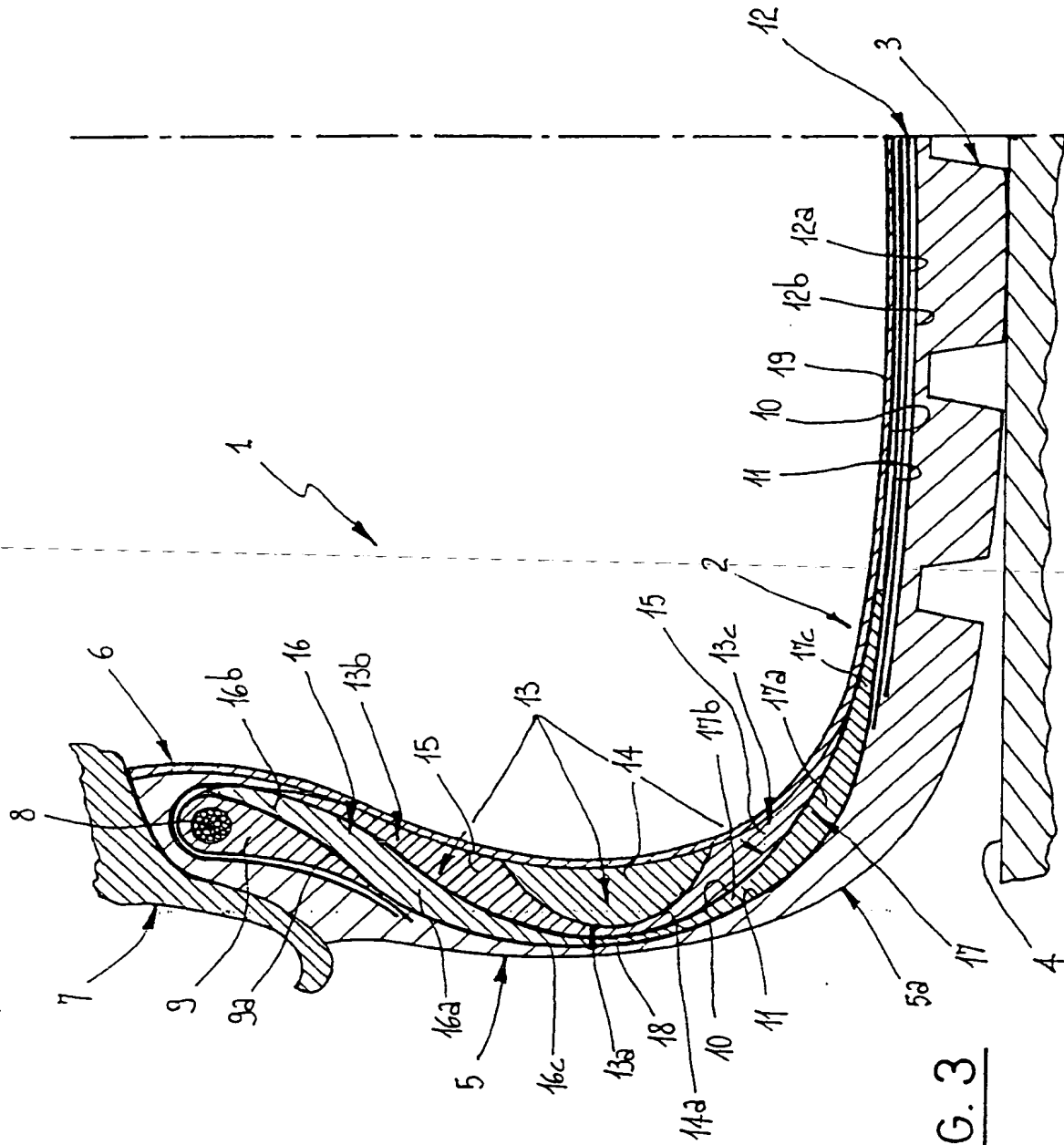


FIG. 3

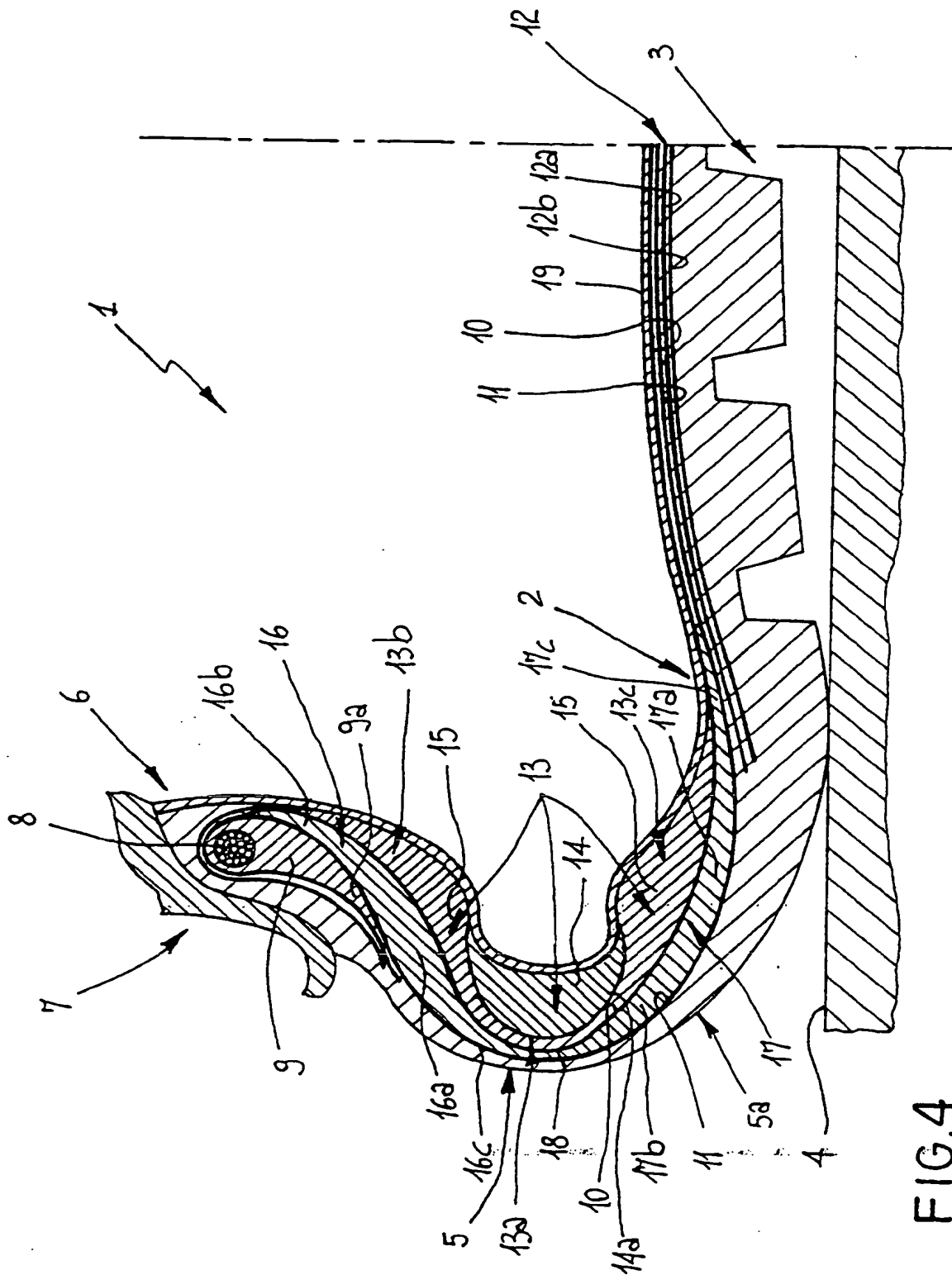


FIG. 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 92119350.4
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
P, A	EP - A - 0 475 258 (PIRELLI COORDINAMENTO PNEUMATICI) * Abstract; fig. 1,2 *	1, 2	B 60 C 17/00 B 60 C 9/14
A	EP - A - 0 005 399 (PNEUMATIQUES, CAOUTCHOUC, MANUFACTURE ET PLASTIQUES KLEBER-COLOMBES) * Abstract; fig. 1-3 *	1	
A	FR - A - 2 469 297 (PNEUMATIQUES, CAOUTCHOUC, MANUFACTURE ET PLASTIQUES KLEBER-COLOMBES) * Totality *	1	
A	GB - A - 2 087 805 (THE GOODYEAR TIRE & RUBBER COMPANY) * Abstract; fig. *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 60 C
The present search report has been drawn up for all claims			
Place of search VIENNA	Date of completion of the search 22-02-1993	Examiner WIDHALM	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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